

Variations in parasitic helminths of *Amietophrynus* species collected from similar habitats, Rivers State, Nigeria

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ABSTRACT:

Habitat differences are known to have direct and indirect effects on the parasitic helminths of amphibians. *Amietophrynus maculatus* and *A. camerunensis* were respectively collected from two residential areas located at Mgbuoba and Choba, Rivers State, Nigeria, for the examination of their helminth endo-parasites. Visual and acoustic survey method was employed for sampling and standard parasitological procedures were used. A total of seven parasites were recovered from the amphibians and one hundred per cent infection was observed in both locations. Five of the parasites were common to hosts from both locations and they were pentastomids (*Raillietiella* sp.), trematodes (*Mesocoelium monodi*) and nematodes (*Amplicaeum africanum*, *Rhabdias africanus* and *Cosmocerca ornata*). However, two other nematode parasite species were recovered from the hosts from Choba, which were not found in hosts from Mgbuoba, and they were *Oswaldocruzia hoepplii* and *Chabaudus leberrei*. Whereas prevalence and mean intensity of *A. africanum* infection were higher in *A. camerunensis* from Choba, both prevalence and mean intensity of infection with *Raillietiella* sp. were higher in hosts from Mgbuoba. Co-infection of *Raillietiella* sp. with *R. africanus* was observed in *A. maculatus* from Mgbuoba, suggesting that both parasites do not exclude each other.

Key words: Parasites, helminths, *Amietophrynus* species, Rivers State.

INTRODUCTION

Amietophrynus species include the common toads such as *A. maculatus*, *A. regularis* and *A. camerunensis*. They are generally warty-bodied and commonly found in drier environments, especially close to human dwellings. They are however, not edible due to the possession of poison glands. They have been reported from several studies in Rivers State including those of [1-5].

This research examined the differences in the composition of the helminth parasites of *Amietophrynus* species that were recovered from residential locations differing in human density.

MATERIALS AND METHODS

Amietophrynus maculatus specimens were collected from Mgbuoba (N4°50.3797', E6°58.1111') while *A. camerunensis* specimens were collected from Choba (N4°53.7674', E6°54.4242') both in Rivers State. They were hand-picked at night between the hours of 19.00 and 21.00. They were euthanized in chloroform vapour and dissected longitudinally for the examination of their helminth parasites.

Sections of the gastro-intestinal tract were examined as well as the lungs in separate Petri dishes. Where present, pentastomids were preserved in 70% alcohol saline, trematodes were fixed in 5% formol saline and nematodes in 70% alcohol. Parasite identification was aided by keys from [6] and [7]. Prevalence and mean intensity of parasitic infections were computed according to [8]. Values were log_x transformed and student t-test was used to check for statistical differences

between the prevalence and mean intensity of the parasites that were common to both locations. The same test was used to evaluate significant differences between parasite prevalence and mean intensity in relation to host sex. Statistical analysis was done using MS Excel.

RESULTS

Fifteen specimens (6 males, 9 females) of *Amietophrynus maculatus* and twenty of *A. camerunensis* (18 males, 2 females) were, respectively, collected from the residential areas in Mgbuoba and Choba, both in Rivers State, Nigeria. One hundred per cent infection was observed in both sites. Five and seven parasite species were recovered from the host specimens from Mgbuoba and Choba, respectively. The following parasites were common to both locations: pentastomids (*Raillietiella* sp.), trematodes (*Mesocoelium monodi*) and nematodes (*Amplicaeum africanum*, *Rhabdias africanus* and *Cosmocerca ornata*). Two additional nematode parasite species were recovered from the hosts from Choba and they were *Oswaldocruzia hoepplii* and *Chabaudus leberrei*. The overall prevalence and mean intensity of infection in host specimens from both locations are presented in Table 1.

Oswaldocruzia hoepplii and *C. leberrei* were not recovered from any of the hosts from Mgbuoba but they were recorded in *A. camerunensis* from Choba, however in very low prevalence and intensity. The lung nematode, *R. africanus*, was recorded once in both locations. In the *A. maculatus* from Mgbuoba, however, two individuals of *R. africanus* were found co-occurring with five individuals of *Raillietiella* sp.,

while in Choba host specimens, *R. africanus* and *Raillietiella* sp. never co-occurred.

Prevalence and mean intensity of *M. monodi* and *A. africanum* were both higher in *A. camerunensis* from Choba than in *A. maculatus* from Mgbuoba. Whereas the prevalence of *M. monodi* was 85.00% with a mean intensity of 16.9 in Choba hosts, the prevalence was 73.3% with a mean intensity of 6.9 in Mgbuoba hosts. The prevalence of *A. africanum* infection was 75.00% and a mean intensity of 7.5 in *A. camerunensis* from Choba while its prevalence

was 6.67% and mean intensity 4.0 in *A. maculatus* from Mgbuoba. However, the prevalence of *Raillietiella* was higher (53.33%) in *A. maculatus* from Mgbuoba than in *A. camerunensis* from Choba where a value of 5.00% was obtained. Similarly, a higher prevalence of 73.33% was recorded for *C. ornata* in Mgbuoba hosts while a value of 55.00% was obtained for *C. ornata* in Choba host specimens. The mean intensity was also higher in *A. maculatus* (14.0) than in *A. camerunensis* (2.9).

Table 1: Overall prevalence (P%) and mean intensity (MI) of infection in *Amietophrynus* species from the study locations

Parasites	Mgbuoba		Choba	
	P (%)	MI	P (%)	MI
Pentastomidea				
<i>Raillietiella</i> sp.	53.33	5.75	5.00	1.00
Trematoda				
<i>M. monodi</i>	73.33	6.91	85.00	16.94
Nematoda				
<i>A. africanum</i>	6.67	4.0	75.00	7.47
<i>C. leberrei</i>	-	-	5.00	1.00
<i>C. ornata</i>	73.33	14.0	55.00	2.91
<i>O. hoeplii</i>	-	-	10.00	2.50
<i>R. africanus</i>	6.67	2.00	5.00	3.00

Table 2: Prevalence (P%) and mean intensity (MI) of helminth infections in *Amietophrynus* species from the study locations

	Mgbuoba				Choba			
	Male P(%)	MI	Female P(%)	MI	Male P(%)	MI	Female P(%)	MI
Pentastomidea								
<i>Raillietiella</i> sp.	0.54	6.33	33.33	4.0	5.56	1.0	-	-
Trematoda								
<i>M. monodi</i>	77.78	6.0	75.0	8.5	88.89	17.38	50.00	3.0
Nematoda								
<i>A. africanum</i>	-	-	20.0	4.0	77.78	7.3	50.00	41.00
<i>C. leberrei</i>	-	-	-	-	5.56	1.0	-	-
<i>C. ornata</i>	66.67	11.5	83.33	17.0	44.44	3.5	50.00	1.0
<i>O. hoeplii</i>	-	-	-	-	11.11	2.5	-	-
<i>R. africanus</i>	11.11	2.0	-	-	-	-	50.00	3.0

Therefore, *M. monodi* and *A. africanum* were more prevalent in *A. camerunensis* from Choba while *C. ornata* and *Raillietiella* sp. were more prevalent in *A. maculatus* collected from Mgbuoba. Student t-test showed no significant differences between the prevalence ($t_8=0.09$, $p=0.47$) and mean intensity ($t_8=0.484$, $p=0.32$) of infections with the five parasite species common to both study locations.

Prevalence and mean intensity of infection were also computed in relation to the sex of host specimens (Table 2). In host specimens from Mgbuoba, prevalence of infection of *Raillietiella* sp. and *C. ornata* were found to be higher in females than in their male counterparts, while that of *M. monodi* was higher in the male host specimens. In those from Choba, prevalence of *M. monodi* and that

of *A. africanum* were higher in males while the prevalence of *C. ornata* was higher in females.

Prevalence and mean intensity of parasites that were found infecting both sexes from both study locations were also subjected to student t-test and it was found that there were no statistically significant differences between the prevalence ($t_4=0.87$, $p=0.22$) and mean intensity ($t_4=0.16$, $p=0.44$) of parasites in male and female hosts from Mgbuoba. There were also no significant differences in the prevalence ($t_4=1.41$, $p=0.12$) and mean intensity ($t_4=0.36$, $p=0.37$) of the parasites in both sexes from Choba.

DISCUSSION

The pentastomid *Raillietiella* sp., which are lung parasites, have been reported from both *A. camerunensis* and *A. maculatus* [2] from Rumuji-Emohua, Rivers State. In that report however, both prevalence (100%) and mean intensity (15.0) of the infection were both higher in *A. camerunensis* than in *A. maculatus* ($P=18.42\%$; $MI= 11.6$). In the present research, it was found that both prevalence and mean intensity were higher in *A. maculatus* from Mgbuoba. It therefore, follows that both species can support high prevalences and intensities of the parasite. The difference observed can, as such, be linked to anthropogenic alterations in the environment that support or hinder the transmission of the infection. For instance, the intermediate host of *Raillietiella* sp. are coprophagous insects, such as cockroaches, which were observed to be more abundant in Mgbuoba. Although human density was higher at Choba, the regular use of insecticides is presumed to have contributed to the reduction in the population of roaches, thereby indirectly leading to a decrease in the prevalence of *Raillietiella* infection in the location.

Only one trematode, *M. monodi*, was recovered from both host species in the study locations. This appears to be the major trematode parasite of *Amietophrynus* species [9–11]. Iyaji [12] did not recover any trematode from *A. regularis* collected from Anyigba, Kogi State, Nigeria. However, [2] recovered *Diplodiscus fischthalicus* from *A. maculatus* from Rumuji-Emohua, Rivers State, Nigeria.

More nematode parasites were recovered from *A. camerunensis* from Choba than from *A. maculatus* from Mgbuoba. Usually, nematode parasites are more dominant in more terrestrial amphibian species, like *Amietophrynus* [13]. *Chabaudus leberrei*

represents a new parasite record for *A. camerunensis*. Whereas the prevalence of *A. africanum* was higher in hosts from Choba, that of *C. ornata* was higher in hosts from Mgbuoba. Both locations were residential areas, though Choba was more populated than the site at Mgbuoba and therefore more polluted with noise and other wastes (biological and non-biological) associated with man such as waste food and drinks, and waste water proof materials. The variations in the distribution of parasites from both locations are presumed to be due to the slight differences in the habitat conditions as a result of human density.

In most other researches, *R. africanus* and *Raillietiella* sp. were reported as single infections of *Amietophrynus* species [10 - 11]. The first report of the co-occurrence of both lung parasites was reported by Amuzie *et al.* [2] from farms in Rumuji-Emohua, Rivers State. This is the second report.

Prevalence of infection was generally higher in female host specimens from Mgbuoba than in the male specimens from the same location. Amuzie *et al.* [2] recorded a similar observation and stated it could be related to the feeding habits of gravid female amphibians which tend to consume more food substances in order to meet with the nutritional and energy requirements of reproduction. In host specimens from Choba, however, higher prevalence of infection was obtained in the male specimens. This is actually in consonance with the findings of some researchers [14 – 16] who stated that high testosterone levels in male amphibians predisposed them to higher infection rates than females.

CONCLUSION

All seven parasites reported in this research have been reported from earlier studies in Nigeria. However, *Chabaudus leberrei* is being reported from *A. camerunensis* for the first time in Nigeria. The co-infection of *R. africanus* and *Raillietiella* sp. is being reported for the second time in Nigeria, both reports coming from Rivers State, Nigeria. This further implies that both parasites do not necessarily exclude each other. Variations in the prevalence of helminth parasites between both locations investigated indicate the effect of anthropogenic modification of the environment on parasitic fauna of closely related host species.

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